

# Exhibit 3

Supplemental Expert Report of Hal J.  
Singer, Ph.D. (April 3, 2018)

**IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF NEVADA**

IN RE:	)	Case No.: 2:15-cv-01045-RFB-(PAL)
	)	
Cung Le, Nathan Quarry, Jon Fitch, Brandon Vera,	)	CLASS ACTION
Luis Javier Vazquez, and Kyle Kingsbury,	)	
on behalf of themselves and all others similarly	)	
situated,	)	
	)	
Plaintiffs,	)	
	)	
vs.	)	
	)	<b>SUPPLEMENTAL EXPERT</b>
	)	<b>REPORT OF HAL J. SINGER, PH.D.</b>
Zuffa, LLC, d/b/a Ultimate Fighting Championship	)	
and UFC,	)	
	)	
Defendant.	)	

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## INTRODUCTION

1. I have been asked by counsel for Plaintiffs to respond to Dr. Topel’s Surrebuttal Expert Report.<sup>1</sup> Having carefully reviewed his new arguments and analyses, I am not persuaded to revise any of my prior opinions. Dr. Topel’s new critiques are contrary to my understanding of the record, and unsupported by basic principles of economics.

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1. Surrebuttal Expert Report of Professor Robert H. Topel (February 12, 2018) [hereafter “Topel Surrebuttal Report”].

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### QUALIFICATIONS

2. My qualifications and CV are contained in my prior reports.<sup>2</sup>

#### I. MY WAGE SHARE ANALYSIS IS THE APPROPRIATE FRAMEWORK FOR ASSESSING THE CHALLENGED CONDUCT

3. As detailed in my prior reports, I have extensively analyzed the relationship between (1) the Challenged Conduct,<sup>3</sup> as measured by share of Fighters locked up by Zuffa into long-term restrictive contracts (“foreclosure share”); and (2) the share of bout-specific revenue (“Event Revenue”) that Zuffa pays to Fighters participating in those bouts (“wage share” or “labor share”).<sup>4</sup> My analysis demonstrates that the wage share paid by Zuffa to its Fighters has decreased as Zuffa’s foreclosure share has increased, even after controlling for more than 1,500 additional factors that could also influence the wage share.<sup>5</sup> Dr. Topel has recognized this basic empirical fact.<sup>6</sup>

4. As explained below, Zuffa’s economists first claimed that my analysis should be disregarded because (according to them) it is economically incorrect to use wage shares to analyze

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2. Expert Report of Hal J. Singer, Ph.D. (August 31, 2017) [hereafter “Singer Report”]; Expert Rebuttal Report of Hal J. Singer, Ph.D. (January 12, 2017) [hereafter “Singer Rebuttal Report”].

3. Singer Report ¶2.

4. Singer Report ¶¶180-187; Singer Rebuttal Report ¶¶72-87.

5. Singer Rebuttal Report ¶124; Singer Report ¶¶180-187.

6. Expert Report of Professor Robert H. Topel (October 27, 2017) [hereafter “Topel Report”], ¶2 [REDACTED] (emphasis original); *see also* Topel Dep. at 50:6-51:2 (“Q. So would you agree that in general the share of UFC Event Revenue going to fighters did, in fact decline over time, say, from 2009 to 2016 even as fighter compensation measured in dollars per fight increased? A. .... I think the evidence is that fighter compensation increased at a different rate, a . . . somewhat lower rate than the increase in revenues so that the ratio would be lower .... The ratio of fighter compensation to total event revenue . . . was on average lower as those revenues increased.”); *id.* at 250:11-251:7 (discussing ZFL-1484034-37) [REDACTED]; *id.* at 252:1-16 [REDACTED] (discussing ZFL-1484034-37). *See also* Singer Report ¶¶271-272 [REDACTED].

compensation.<sup>7</sup> Faced with abundant evidence to the contrary—showing that economists in general and sports economists in particular have analyzed wage shares extensively (and that even Zuffa’s economists have done so in their capacity as consultants)<sup>8</sup>—Dr. Topel has now shifted the goalposts: In his Surrebuttal, Dr. Topel asserts that my analysis of Fighter wage share is divorced from the extensive economic literature reviewed in my rebuttal report because, he claims, no paper (or expert report in a monopsony case) has used precisely the same dependent variable (wage share) *and* explanatory variable (foreclosure share) in a regression model as I have in this proceeding.<sup>9</sup> This new claim is misleading and irrelevant: As I explain below, I analyze the empirical relationship between changes in labor market restrictions and changes in the share of revenue paid to athletes. The existing economic literature clearly establishes that this is a perfectly valid—and indeed quite standard—line of inquiry for economic analysis, particularly when studying the impact of monopsony power.

5. In his Surrebuttal, Dr. Topel also makes the new claim that my analysis “requires the assumption that athletes are the only material drivers of revenue[.]”<sup>10</sup> This is patently false; none of my analyses makes this assumption. It is obvious that inputs other than the Fighters themselves are necessary to stage Live MMA Events, just as non-athlete inputs are necessary for the production of other professional sporting events. As explained below, the sports economics literature on wage shares does not assume that athletes are the only material drivers of revenue, and neither does my analysis here. My analysis allows the data to inform the extent to which

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7. Topel Report ¶¶127; ¶130; Expert Report of Professor Paul Oyer (October 27, 2017) [hereafter “Oyer Report”], Part V.A.

8. Singer Rebuttal Report ¶¶88-107.

9. Topel Surrebuttal Report ¶¶13-23.

10. *Id.* ¶¶16, ¶21 (“Dr. Singer’s approach...hinges on the assumption that only athletes have a material impact on revenue.”).

Fighters contribute to Zuffa's Event Revenue, and to determine whether and the extent to which the labor market restrictions imposed by the Challenged Conduct have reduced Fighter wage shares below what would have been earned under more competitive conditions. It does so using statistical benchmarks based on the share of revenue paid to Fighters under more competitive conditions—not by assuming that non-Fighter inputs are irrelevant.<sup>11</sup> Relatedly, none of my analyses implies, assumes, or concludes that Fighters would appropriate 100 percent of Event Revenue (or of any increase in Event Revenue) in the but-for world, just as no sports economist claims that athletes would appropriate 100 percent of team revenue (or of any increase in team revenue), even under the most competitive conditions.

**A. In Contrast To Prior Claims, Dr. Topel No Longer Contends That Economists Do Not Use Wage Shares To Analyze Compensation**

6. In their initial reports, Zuffa's economists had claimed categorically that wage share is an inappropriate focus for economic analyses of compensation, and that my analysis of Fighter wage shares should therefore be disregarded in its entirety simply for using wage shares at all. Dr. Topel asserted that "standard economic models of competitive labor markets make predictions about the *level* of worker pay, not about worker pay as a *share* of revenue,"<sup>12</sup> and that wage share "is not a measure of anything useful or informative."<sup>13</sup> Similarly, Dr. Oyer claimed "labor share is not an economically accepted way to evaluate worker compensation,"<sup>14</sup> and that "[l]abor share is

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11. Singer Rebuttal ¶3; ¶¶73-75; Singer Report ¶183.

12. Topel Report ¶130 (emphasis added).

13. *Id.* ¶127.

14. Oyer Report Part V.A.

not generally accepted in the field of labor economics as a method for determining compensation in a competitive labor market[.]”<sup>15</sup>

7. My rebuttal report demonstrated that these claims are simply false. My rebuttal report included an extensive review of relevant economic literature, documenting (1) that sports economists commonly analyze monopsony power using the share of revenue paid to athletes;<sup>16</sup> and (2) that economists have also analyzed wage shares in a range of non-sports industries.<sup>17</sup> [REDACTED]

[REDACTED]

[REDACTED] It also explained that Dr. Topel used wage

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15. *Id.* ¶30. Although Dr. Blair did not critique my analysis of wage share specifically, he claimed that Professor Zimbalist’s analysis of the “labor share of total revenue going to athletes... and the labor share going to the athletes in UFC... is inconsistent with standard principles of economics.” Blair Report ¶12.

16. Singer Rebuttal ¶¶95-102, citing Gerald Scully, *Player Salary Share and the Distribution of Player Earnings*, 25(2) MANAGERIAL AND DECISION ECONOMICS, 77-86, 77 (2004) [hereafter “Scully (2004)”]; Lawrence Kahn, *The Sports Business as a Labor Market Laboratory*, 14(3) JOURNAL OF ECONOMIC PERSPECTIVES 75-94 [hereafter “Kahn (2000)”] at 81 (citing ANDREW ZIMBALIST, *BASEBALL AND BILLIONS* (New York: Basic Books 1992)); John Vrooman, *Theory of the Perfect Game: Competitive Balance in Monopoly Sports Leagues*, 34(1) REVIEW OF INDUSTRIAL ORGANIZATION 5-44, 42 (2009) [hereafter “Vrooman (2009)”]; John Vrooman, *The Economic Structure of the NFL* in *THE ECONOMICS OF THE NATIONAL FOOTBALL LEAGUE: THE STATE OF THE ART*, 22-25, 29 (KevinG. Quinn ed., Springer 2012) [hereafter “Vrooman (2012)”]; John Twomey & James Monks, *Monopsony and Salary Suppression: The Case of Major League Soccer in the United States*, 56(1) THE AMERICAN ECONOMIST 20-28 (2011) [hereafter “Twomey & Monks”]; ROBERT PINDYCK & DANIEL RUBINFELD, MICROECONOMICS 549 (Pearson 8th ed. 2013) [hereafter “PINDYCK & RUBINFELD”]; LIBBY RITTENBERG & TIMOTHY TREGARTHEN, PRINCIPLES OF MICROECONOMICS 356 (Flat World Knowledge 2009) [hereafter “RITTENBERG & TREGARTHEN”]; Kevin Murphy & Robert Topel, *The Economics of NFL Team Ownership*, Chicago Partners (2009).

17. Singer Rebuttal ¶¶103-107, citing ROY RUFFIN & PAUL GREGORY, PRINCIPLES OF MICROECONOMICS 331-36 (Harper Collins 5th ed. 1993); Sabien Dobbelaere & Jacques Mairesse, *Panel Data Estimates of the Production Function and Product and Labor Market Imperfections*, 28 JOURNAL OF APPLIED ECONOMETRICS 1-46, 2 (2013); David Autor, David Dorn, Lawrence Katz, Christina Patterson, & John Van Reenen, *Concentrating on the Fall of the Labor Share*, 107(5) AMERICAN ECONOMIC REVIEW: PAPERS & PROCEEDINGS 180-185 (2017); *id.* at 185 (citing: Nicholas Kaldor, *Capital Accumulation and Economic Growth*, in *THE THEORY OF CAPITAL*, 177-222 (F.A. LUTZ AND D.C. HAGUE EDS. St. Martin’s Press 1961); Michael W.L. Elsby, Bart Hobijn, and Aysegul Sahin, *The Decline of the U.S. Labor Share*, BROOKINGS PAPERS ON ECONOMIC ACTIVITY, 1-42 (2013) [hereafter “Elsby et al.”]; Loukas Karabarbounis & Brent Neiman, *The Global Decline of the Labor Share*, 129 (1) QUARTERLY JOURNAL OF ECONOMICS, 61-103; Matthew Rognlie, *Deciphering the Fall and Rise in the Net Capital Share: Accumulation or Scarcity?*, BROOKINGS PAPERS ON ECONOMIC ACTIVITY, 1-69 (2015); and Simcha Barkai, “Declining Labor and Capital Shares,” University of Chicago New Working Paper Series No. 2 (November 2016) [hereafter “Barkai”], available at <https://research.chicagobooth.edu/~media/5872fbeb104245909b8f0ae8a84486c9.pdf>); Paul Oyer & Scott Schaefer, *Personnel Economics: Hiring and Incentives*, in, IV THE HANDBOOK OF LABOR ECONOMICS, Ch. 20 (ORLEY ASHENFELTER AND DAVID CARD EDS. 2011); Jan De Loecker & Jan Eeckhou, “The Rise of Market Power and the Macroeconomic Implications,” NBER Working Paper No. 23687 (August 2017) [hereafter “De Loecker & Eeckhou”].

18. Singer Rebuttal ¶108.

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shares in his capacity as a consultant to the NFL Players Association to study the impact of the 2006 Collective Bargaining Agreement on revenue allocation between players and owners,<sup>20</sup> and that Dr. Blair analyzed wage shares when consulting for Zuffa.<sup>21</sup>

8. In addition, Professor Manning—acknowledged by Dr. Oyer as “a recognized expert and leader in the...analysis of monopsony in labor markets”<sup>22</sup>—submitted a rebuttal declaration explaining that “[w]age share can be an appropriate way for a labour economist to analyse compensation,”<sup>23</sup> and that “[w]age share is an appropriate way to analyse the compensation of MMA fighters in this case.”<sup>24</sup> Dr. Oyer made much of the fact that Professor Manning’s seminal textbook on monopsony did not use any examples where wage share was the dependent variable.<sup>25</sup> In his report, Professor Manning clarified that the reason for this omission was that, in contrast to the instant case, the revenue data necessary to compute wages shares are generally not available to academic researchers.<sup>26</sup>

9. In light of these developments, Dr. Topel makes no attempt in his Surrebuttal to repeat or defend his original claim that wage share “is not a measure of anything useful or

19. *Id.*, n. 407 (citing WME-ZUFFA-0001150, at 11).

20. Singer Rebuttal ¶¶101-102. Dr. Topel claims that “[My] study [using labor share] does not analyze how much NFL players should be paid, or would be paid in a competitive marketplace, it only analyzes whether NFL teams could afford to pay players the amounts that had been agreed to in the CBA.” Topel Surrebuttal Report ¶20. This is hair splitting. Dr. Topel’s analysis of what the NFL “could afford” to pay its athletes (his clients) was obviously meant to inform what “should be paid” to the athletes.

21. Singer Rebuttal ¶101, n. 363.

22. Oyer Dep. 122:17-21 (“Alan Manning is a recognized expert and leader in the thinking of monopsony -- analysis of monopsony in labor markets. So his book and his handbook chapter are authoritative sources among labor economists.”).

23. Expert Rebuttal Report of Alan Manning (January 12, 2018), ¶5 [hereafter, “Manning Rebuttal”].

24. *Id.*

25. Oyer Report ¶22.

26. Manning Rebuttal ¶19 (“The data sets analysed in that book...are individual data sets containing only very limited information on employers...they contain no variable that would allow computation of wage share.”) As Professor Manning observed, “Dr. Oyer fails to give a single example in which a researcher was interested in comparing compensation with marginal revenue product and could have used worker wage share in an empirical investigation but chose not to do so.” *Id.* ¶20.

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informative.”<sup>27</sup> Nor could he. More generally, none of Zuffa’s economists has attempted to resuscitate his prior categorically false claims regarding economists’ analysis of wage shares. Instead, Dr. Topel has shifted the goalposts.

**B. Dr. Topel Now Illogically Claims That My Wage Share Analysis Is Somehow Distinct From Any Other Wage Share Analysis Ever Published By Any Economist**

10. Dr. Topel now claims in his Surrebuttal that my wage share analysis is distinct from any wage-share analysis ever previously published by any economist, and that therefore the extensive empirical economic literature on wage share (which he had previously claimed did not exist) somehow provides no support for my own approach in this case.<sup>28</sup> Dr. Topel is wrong, and his reasoning is incoherent. He asserts that “many”<sup>29</sup> of the published studies cited in my rebuttal report, “do not purport to diagnose the existence of monopsony power”<sup>30</sup>—a clear admission that *at least some* economists have analyzed wage share for the express purpose of analyzing monopsony power.

11. Similarly, Dr. Topel claims that *some* of the articles cited in my rebuttal report do not use revenue as a proportional proxy for marginal revenue product (“MRP”)—a clear admission that economists *have* conducted analyses consistent with the empirically and factually supported point in this case that, as in many other professional sports, the athletes (here the Fighters) are a key driver of Zuffa’s Event Revenue.<sup>31</sup> Under these conditions, a *change* in Event Revenue is a

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27. Topel Report ¶127.

28. Topel Surrebuttal Report ¶¶13-23.

29. *Id.* Part II.B.4.

30. *Id.*

31. Topel Surrebuttal Report ¶¶15-16.

suitable proxy for a *change* in Fighter MRP over that same period. In other words, Fighter MRP is, holding other factors constant, proportional to (although not equal to) Event Revenue.<sup>32</sup>

12. Dr. Topel also claims that some of the studies cited in my rebuttal report “do something different”<sup>33</sup> than what I did in my analysis. What is “different” about these studies (according to Dr. Topel) is that they analyze the effect on the wage share of a “known change”<sup>34</sup> in monopsony power, as opposed to its mere “existence,” “such as eliminating the reserve clause in baseball,”<sup>35</sup> which “has clear implications for [athlete] compensation.”<sup>36</sup> Dr. Topel is certainly correct that eliminating the reserve clause increased athlete wage shares, but he fails to recognize the clear parallels between these purportedly “different” studies and my own analysis: In each case, the analytical focus is on the empirical relationship between *changes* in labor market restrictions and *changes* in the share of revenue paid to athletes. The economic literature clearly establishes that this is a perfectly valid line of inquiry for economic study.<sup>37</sup> My analysis of wage shares in this case adopts the same fundamental approach, using standard multiple regression techniques to analyze the empirical relationship between changes in labor market restrictions (measured by changes in the proportion of Fighters locked up by long-term exclusive contracts), and changes in the wage share paid to Fighters.<sup>38</sup> My analysis demonstrates that the wage share

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32. Singer Rebuttal Report ¶5.

33. Topel Surrebuttal Report ¶22.

34. *Id.*

35. *Id.*

36. *Id.*

37. Singer Rebuttal Report ¶¶95-102 (articles listed in n. 16, *supra*).

38. Dr. Topel conceded that eliminating the challenged contractual provisions would create “a transfer of wealth from Zuffa to the athletes,” and that eliminating the challenged contractual provisions could enhance fighter mobility and lead to higher fighter compensation, at least in the short run. Singer Rebuttal Report ¶71, citing Topel Dep. at 76:4-77:3; *id.* at 84:11-18 (“Q. It’s a transfer of wealth, in your view, from Zuffa to the fighters because in this instance Zuffa would either have to pay the fighters more or someone else would pay the fighters more, right? ... A. I think I see where you’re going with it and yes.”); *id.* at 84:25-85:5 (“Q. So for the existing stock of Zuffa athletes eliminating the challenged contracts, at least in the short run, would enhance fighter mobility and lead to higher fighter compensation, correct? A. It could do that.”); *id.* at 86:1-11 (“Q. Is it fair to say in the short run if we eliminate the

did, in fact, decrease as Zuffa's foreclosure share has increased (even after holding scores of other factors constant). If it had been otherwise (for example, if the wage share had remained fixed, rather than declining), my analysis would not have found that the Challenged Conduct reduced Fighter compensation.

**1. My Wage Share Analysis Follows Standard Methods Employed in the Economic Literature.**

13. My wage share analysis flows directly from prior analyses that economists have implemented in studying other professional sports. As explained in my rebuttal report, economists have analyzed wage shares in all major professional sports, and have found in published studies that the share of revenue paid to athletes has increased as labor market restrictions have been relaxed.<sup>39</sup> Similarly, my own analysis measures the relationship between the wage share of Zuffa Fighters and the labor market restrictions imposed by the challenged contracts. The key difference between my own analysis and that performed in prior work is that, in the context of this litigation, I have access to a much larger and more granular database than the typical academic researcher. This allows me to analyze wage shares using standard multivariate regression methods, whereas academic researchers have frequently been limited to simpler before-after comparisons to trace the impact of a change in labor mobility restrictions on wage shares. My application of a *more rigorous* method to a more granular data set could hardly invalidate my approach.

14. When limited to publicly available data, sports economists have been forced to analyze wage shares at a highly aggregated level (such as calculating the annual share of revenue paid to athletes within a given sport). For example, in a 2004 article published in *Managerial and*

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challenged contractual provisions, one immediate effect is that fighters get paid closer to the amount of Event Revenue that they generate for the promotion; is that fair? ... A. They'll get paid more than they would have because they're getting some of the returns on the investment that were previously shared with – with the investing firm.”).

39. Singer Rebuttal Report ¶¶95-102 (articles listed in n. 16, *supra*).

*Decision Economics*, Professor Scully analyzed athlete compensation as a percentage of the revenues for baseball, basketball, football, and hockey.<sup>40</sup> As seen in Table 1 of that article (reproduced below), the analysis was limited to annual wage shares, intermittently available between the early 1970s and the late 1990s, yielding a total of just eleven data points for each sport:

<b>Table 1. Player Compensation as a Share of Revenue in Profession Team Sports</b>				
Year	MLB	NBA	NFL	NHL
1970/73	15.9	46.1	34.4	21.3
1980	31.3	NA	35.4	NA
1990	31.6	40.6	41.0	30.0
1991	45.3	39.3	47.2	32.6
1992	57.8	43.8	59.6	39.1
1993	56.5	49.5	69.8	40.7
1994	63.4 <sup>a</sup>	41.4	64.1	41.4
1995	61.9 <sup>a</sup>	46.2	65.3	38.2 <sup>a</sup>
1996	53.6	46.9	60.1	51.1
1997	50.6	NA	53.4	NA
1998	48.4	54.2	55.4	58.4

<sup>a</sup> Shortened season due to player-management contract dispute.  
*Sources:* For 1990–1996, except for player salary in football, figure is player compensation divided by total revenue from *Financial World*. For football (1992–1998), total player pay was provided by the NFLPA. For 1997 and 1998, data is from *Forbes*. Earlier data is from Scully (1989, p. 112), and from various Congressional Hearings in 1976 and 1982.

Nonetheless, the wage shares in Table 1 are economically informative as to the effect of changes in labor market restrictions on athlete compensation. As Dr. Scully explains, low wage shares in the earlier years reflect tight labor market restrictions; the effect was particularly pronounced for baseball and hockey, given the absence of interleague competition:

Prior to veteran free agency, players were restricted in their ability to move between clubs...The result of these restrictions was that player salary or compensation as a share of league revenues was rather small...in 1970-1973, players got somewhat less than 16% of revenues in baseball, and about 21% in ice hockey. Major league baseball and the National

40. Singer Rebuttal Report ¶95, citing Scully (2004). *See also* Singer Rebuttal ¶¶95-102 (reviewing other analyses of athlete compensation as a share of revenue).

Hockey League had the most restrictive labor market rules. In football and basketball, player salary share was higher in this period. Players benefited, at various times, from interleague competition in football (AFL 1960-1969, WFL 1974-1975, USFL 1983-1985), basketball (ABA 1968/60-1975/76), and in hockey (WHA 1972/73-1978/79). This competition put considerable upward pressure on player salaries. While the labor market was restricted de jure, the prospect of players jumping to the competing leagues forced salaries and the player share of revenues upward.<sup>41</sup>

15. In contrast to the limited, low-frequency wage share data seen above, in this litigation, I have access to a wealth of information, including financial records reporting the Event Revenue generated at specific Live MMA Events featuring a set of specific Fighters during (and before) the Class Period, and event-specific compensation paid to each MMA Fighter who was featured in said event. [REDACTED]

[REDACTED] This type of granular information on wage shares is not widely available in other professional sports, such as baseball and football: For these sports, event-specific revenue are confidential, and hence generally unavailable to academic researchers. Even if a researcher could obtain, for instance, data on event-specific revenue streams for individual baseball games (such as box office receipts and broadcast license fees), there would be no way to compute event-specific wage shares: Baseball players, like most professional athletes, are not compensated on a per-game basis, and receive compensation more akin to that of employees with annual salaries. This difference in technique due to the lack of granular data in prior analyses is hardly an indictment of my methods, as suggested by Dr. Topel.

16. [REDACTED]

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41. Scully (2004) at 78.

42. [REDACTED]  
[REDACTED] Singer Report Table 6; Singer Rebuttal Report Appendix Table A2.

██████████ This allows me to implement a significantly *more rigorous* version of prior published economic analyses of wages shares. Nonetheless, the fundamental approach is directly analogous to prior published work. Prior published studies have evaluated the effect of changes in labor market restrictions such as changes in the reserve clause on changes in athlete wage shares in major professional sports; my own analysis studies the effect of an increase in the prevalence of long-term restrictive contracts on the wage shares of Zuffa Fighters. In each case, the analytical focus is on the empirical relationship between labor market restrictions and the wage share.

**2. My Wage Share Analysis, Like the Economic Literature on Wage Shares, Does Not Assume that Athletes Are Solely Responsible for Generating Event Revenue.**

17. In his Surrebuttal, Dr. Topel makes the new and false claim that my analysis, or indeed any analysis that uses wage shares, “requires the assumption that athletes are the only material drivers of revenue[.]”<sup>44</sup> As should be clear from my prior reports, my analysis does not make this assumption, nor does the economic literature on wage shares. My wage share analysis allows the data to inform the extent to which Fighters contribute to Zuffa’s Event Revenue. In particular, my wage share analysis makes use of two key statistical benchmarks.<sup>45</sup> The first is based on the share of revenue paid to Zuffa Fighters when Zuffa had foreclosed a smaller proportion of the market, and thus had less monopsony power.<sup>46</sup> The second is based on the share

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43. Singer Rebuttal Report ¶36; Singer Report ¶¶180-187.

44. Topel Surrebuttal Report ¶16; *id.* ¶21 (“Dr. Singer’s approach...hinges on the assumption that only athletes have a material impact on revenue.”)

45. Singer Rebuttal Report ¶3; *id.* ¶¶73-75; Singer Report ¶183.

46. Singer Rebuttal Report ¶74.

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of Event Revenue that Strikeforce paid its own Fighters before Zuffa acquired it.<sup>47</sup> According to both benchmarks, non-Fighter inputs contribute significantly to MMA revenue.<sup>48</sup>

18. Relatedly, none of my analyses implies, assumes, or concludes that Fighters would appropriate 100 percent of Event Revenue (or of any increase in Event Revenue) in the but-for world,<sup>49</sup> just as no published article in the sports economics literature concludes that athletes would receive 100 percent of team revenue (or of any increase in team revenue), even under the most competitive conditions. For example, Dr. Scully estimated that “under unrestricted free agency for all players, the upper bound on player compensation as a share of revenue in team sport would approach about 70%;”<sup>50</sup> similarly, the sports economist John Vrooman estimated that “[a]ll [major sports] leagues have similar carrying capacities for player costs at two-thirds of revenues and current payroll cap percentages are almost identical at about 60 percent.”<sup>51</sup> Consistent with this literature, my analysis finds that Zuffa would continue to appropriate a significant share of the Event Revenues generated in the but-for world.

19. It bears emphasis that the many control variables included in my analysis are *held constant* between the actual and but-for worlds. [REDACTED]

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47. *Id.* ¶75.

48. [REDACTED] Singer Report ¶248; *id.* Table 9.

49. Singer Report Tables 9-11.

50. Singer Rebuttal Report ¶96 (citing Scully (2004), at 80).

51. *Id.* ¶97 (citing Vrooman (2009)).

52. Singer Report Table 4 [REDACTED]



[REDACTED] For example, the Fighter-specific factors included in my analysis account for the fact that a superstar such as Conor McGregor receives a higher fraction of Event Revenue than other Fighters in the actual *and* but-for worlds. My analysis does not predict that even a superstar such as McGregor would capture all (or almost all) Event Revenue in the but-for world; to the contrary, the effect of McGregor's superstardom on his share of Event Revenue is held fixed between the actual and but-for worlds.

**3. My Wage Share Analysis, Like the Economic Literature on Wage Shares, Uses Revenue Directly Traceable to Athletes as a Proxy for MRP.**

20. The wage share used in my analysis is the ratio of Fighter compensation at a particular event featuring that Fighter to the Event Revenue generated at that event. Event Revenue consists of revenue that is directly traceable to specific events involving specific Fighters, such as PPV buys, live event ticket sales, and so on.<sup>54</sup> This follows the standard approach in sports economics, which is to measure athlete compensation relative to the revenue generated by athletes—that is, relative to their MRP.<sup>55</sup> In some cases, sports economists have estimated MRP

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53. *Id.* Table 4 [REDACTED]

*id.* ¶184.

54. *Id.* ¶181, n. 451.

55. Singer Rebuttal Report ¶¶92-94. *See* MICHAEL KATZ & HARVEY ROSEN, MICROECONOMICS (Irwin McGraw-Hill 3rd ed. 1998), at 312-315, 417-419; RODNEY D. FORT, SPORTS ECONOMICS (Prentice Hall 3rd ed. 2011), at 206; ROGER BLAIR, SPORTS ECONOMICS (Cambridge University Press 2012) at 354-355; David Berri, Michael Leeds, & Peter von Allmen, *Salary Determination in the Presence of Fixed Revenues* 10 INTERNATIONAL JOURNAL OF SPORT FINANCE 5-25 (2015), at 6; Kahn (2000); Gerald Scully, *Pay and Performance in Major League Baseball*, 64(6) AMERICAN ECONOMIC REVIEW, 915-930 (1974) [hereafter "Scully (1974)"]; John Charles Bradbury, *What is Right with Scully Estimates of a Player's Marginal Revenue Product*, 14(1) JOURNAL OF SPORTS ECONOMICS 87-96 (2013) at 93; Roger G. Noll, *Attendance and Price Setting*, in ROGER G. NOLL, GOVERNMENT AND THE SPORTS BUSINESS, 115-157 (Brookings Institution, 1974); Ira Horowitz, *Sports Broadcasting*, in ROGER G. NOLL, GOVERNMENT AND THE SPORTS BUSINESS, 275-323 (Brookings Institution, 1974); Gerald W. Scully, *Binding Salary Arbitration in Major League Baseball*, 21(3) AMERICAN BEHAVIORAL SCIENTIST 431-450 (1978); James Cassing and Richard W. Douglas, *Implications of the Auction Mechanism in Baseball's Free Agent Draft*, 47(1) SOUTHERN ECONOMIC JOURNAL 110-121 (1980); Paul M. Sommers and Noel Quinton, *Pay and Performance in Major League Baseball: The Case of the First Family of Free Agents*, 17(3) THE JOURNAL OF HUMAN RESOURCES 426-436 (1982); Henry J. Raimondo, *Free*



for individual athletes, and then compared those estimates to the compensation received by each athlete. This approach is appropriate when: (1) the objective of the analysis is to measure the MRP of individual athletes; and (2) the revenue-generating ability of individual athletes must be teased out from aggregated revenue data.<sup>56</sup> In other cases, rather than estimate MRP for individual athletes, economists have often used the share of revenue returned to the players in the form of salaries as evidence of the degree of monopsony control.<sup>57</sup> In these studies, the degree of monopsony power is inferred by analyzing the relationship between labor market restrictions and the wage share paid to athletes.<sup>58</sup> That is the approach that I adopt in my wage share analysis.

21. Zuffa's economists recognize that the exercise of monopsony power is properly measured by the extent to which athletes are underpaid relative to their MRP.<sup>59</sup> This is precisely what my analysis measures. The only necessary factual underpinning for my analysis, as in prior studies, is that *change* in Event Revenue is a suitable proxy for a *change* in Fighter MRP over that same period, such that, all else equal, Event Revenue is proportional to (not equal to) Fighter MRP. And the evidence is clear that it is. As in other sports, in MMA, revenue generation changes

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*Agent's Impact on the Labor Market for Baseball Players*, 4(2) JOURNAL OF LABOR RESEARCH 183-93 (1983); James R. Hill and William Spellman, *Professional Baseball: The Reserve Clause and Salary Structure*, 22(1) INDUSTRIAL RELATIONS 1-19 (1983); Rodney D. Fort and Roger G. Noll, *Pay and Performance in Baseball: Modeling Regulars, Reserves and Expansion*, California Institute of Technology Social Science Working Paper 527 (May 1984), available at <https://authors.library.caltech.edu/81597/1/sswp527.pdf>; Roger G. Noll, *The Economics of Sports Leagues in* GARY A. UBERSTINE, LAW OF PROFESSIONAL AND AMATEUR SPORTS (Clark Boardman 1988); Monks (2013) at 3; Anthony Krautmann, *What's wrong with Scully-Estimates of a Player's Marginal Revenue Product* 37(2) ECONOMIC INQUIRY 369-381 (1999).

56. *Id.* ¶94. For example, to estimate the MRP of individual baseball players, Dr. Scully had first to perform regressions relating individual athlete performance to win probabilities, and then to perform regressions relating win probabilities to aggregate team revenue. *Id.*, citing Scully (1974), and related literature.

57. Singer Rebuttal Report ¶95.

58. *Id.* ¶¶95-100 (citing numerous economic analyses of wage shares in professional sports, from elementary textbooks to articles in professional journals, including Scully (2004); Kahn (2000); Vrooman (2009); Vrooman (2012); Twomey & Monks, at 20-28; PINDYCK & RUBINFELD; and RITTENBERG & TREGARTHEN).

59. Singer Rebuttal Report ¶90. In his Surrebuttal, Dr. Topel states: "I largely agree with Dr. Singer on this point. If one could reliably measure the MRP of Zuffa's athletes, a comparison of those athletes' compensation to their MRP could be informative in assessing whether, or to what extent, the Challenged Conduct anticompetitively reduced MMA athletes' compensation." Topel Surrebuttal Report ¶4.

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in proportion to athlete productivity. Thus, all else equal, if Fighter compensation fails to keep pace with the growth in Zuffa's Event Revenue—such that the wage share falls as Event Revenue rises—that is evidence of the exercise of monopsony power.<sup>60</sup> That is precisely what my econometric analysis finds, as do prior analyses of wage shares by sports economists.<sup>61</sup>

22. Dr. Topel claims in his Surrebuttal that Event Revenue at an event featuring a particular set of Fighters is “not a proxy for [those] athletes’ MRP.”<sup>62</sup> This claim is incorrect. My finding that *changes* in Event Revenue are an excellent proxy for *changes* in Fighter MRP is confirmed by voluminous evidence in the record: As in other professional sports, Fighters are the major draw for MMA consumers, and thus are a key driver of Zuffa's Event Revenue.<sup>63</sup> It is nearly tautological: Matchups involving popular, highly-ranked, headlining Fighters sell more PPV buys, event tickets, and so on, than do matchups involving less prominent opponents.<sup>64</sup>

23. That growth in Event Revenue is a suitable proxy for growth in Fighter MRP is also confirmed by Dr. Topel's own testimony. For example, Dr. Topel admitted that “one of the reasons why athlete talent is valuable is because the athletes are capable of generating revenues for the organization,”<sup>65</sup> and opined that Zuffa is in the business of “causing its fighters to be more

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60. Singer Rebuttal Report ¶5.

61. Singer Rebuttal Report ¶¶95-102 (articles listed in n. 16, *supra*).

62. Topel Surrebuttal Report ¶5.

63. Singer Report ¶20

*id.* ¶28 (“the fighters themselves, not the UFC titles, are what truly drive PPV buy rates,” citing Richard McGowan and John Mahon, *Demand for the Ultimate Fighting Championship: An Econometric Analysis of PPV Buy Rates* 6(6), JOURNAL OF BUSINESS & ECONOMICS 1032-1056, 1047 (2015) [hereafter “McGowan & Mahon”]); Singer Report ¶¶156-164

64. Singer Rebuttal Report ¶132 (showing that Zuffa relies heavily on Headliners (top 15 Fighters) to fill the Top of the Card, and that at least one of the Fighters at the Top of the Card was a Headliner in 158 of 159 events UFC PPV events from 2005 to May 2017; *id.* ¶130

65. *Id.* ¶113, n. 420, citing Topel Dep at 27:22-25.

effective revenue generators.”<sup>66</sup> By definition, a fighter can only be a “more effective revenue generator” to the extent that his or her MRP has increased. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

24. My rebuttal report explained that, having conceded that the Challenged Conduct constitutes an exercise of Zuffa’s monopsony power to suppress Fighter compensation, Dr. Topel is left to speculate, without evidence, that these benefits to Fighters would be transitory because removal of the Challenged Conduct would result in lower investment in MMA over the long run.<sup>68</sup> In his Surrebuttal, Dr. Topel reiterates his unsupported speculation that the Challenged Conduct, as measured by Zuffa’s foreclosure share, reflects “investments [that] raise the demand for Zuffa-

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66. *Id.* ¶136, n. 485, citing Topel Report ¶311; Topel Dep. at 24:20-25:9 (“Q. Okay. So if what Zuffa does is . . . makes its fighters more effective revenue generators, then what you were saying is that Zuffa in this example is causing the marginal revenue product of its fighters to increase, correct? A. Yes. Q. And is it your opinion that Zuffa is particularly good at is causing its fighters to be more effective revenue generators? A. I think that’s Zuffa’s position and I think that’s what the evidence tends to show, yes. Q. Is it your opinion? A. I just said yes.”). *Id.* at 77:22-78:6 (“Q. So, in your view, because Zuffa has invested in promoting these athletes they [are] as a group are more valuable...to a rival promoter than unranked fighters sitting in an MMA gym somewhere; is that right? A. I think what you said is right, yeah. Q. And what it means to be more valuable in this context is these fighters are capable of bringing in more revenues when they fight, correct? A. Yeah ...”). *See also id.* at 36:24-37:4 (“Q. What you’re saying is that one of the ways in which Zuffa has become successful is by boosting the ability of its fighters to generate revenues when they fight, correct? A. Yeah. The point of investing is to generate revenues.”). Dr. Topel admitted that promotion contributes to an athlete’s human capital. *Id.* at 28:22-25. Dr. Topel acknowledged further that the more human capital an MMA fighter has, all things equal, the more revenues he’s capable of generating when he fights. *Id.* at 29:6-12. Dr. Topel also admitted that Zuffa’s promotional efforts in creating The Ultimate Fighter increased the MRP of MMA fighters generally. *Id.* at 31:7-13 (“Q. Did that promotional effort in creating the show increase the marginal revenue product of MMA fighters generally? A. You mean – when you say generally, you mean like at other – Q. Yes. A. For other promoters and everything, yes.”). Dr. Topel additionally conceded that a fighter who is a household name because of Zuffa’s investments and promoting that fighter, all things equal, would generate more revenues for the UFC when he fights than a fighter who is not a household name. *Id.* at 37:24-38:8.

67. Singer Rebuttal Report ¶113, citing Topel Dep. at 241:4-16 (discussing WME-ZUFFA-00001150) [REDACTED]

68. Singer Rebuttal Report ¶213.

promoted events and also raise the share of highly rated athletes that contract with Zuffa.”<sup>69</sup> According to Dr. Topel, Zuffa’s foreclosure share reflects “Zuffa’s own investments and efforts in increasing the value of the events and athletes it promotes,”<sup>70</sup> thereby increasing Zuffa’s revenue.<sup>71</sup>

25. These assertions mirror prior claims made by Dr. Topel that “[t]he [challenged] contract provisions are efficient and procompetitive responses to contracting externalities and transactions costs that would otherwise hinder promoters’ investments in the quality and marketability of MMA Fighters and events.”<sup>72</sup> As my rebuttal report explained, Dr. Topel has provided no evidence that the Challenged Conduct increased investments in Fighters specifically or MMA generally.<sup>73</sup> The same is true of Dr. Topel’s Surrebuttal.

26. Further, even if Dr. Topel had evidence that the Challenged Conduct incentivized investments on Zuffa’s part that caused Zuffa’s Event Revenue to increase, that would still not imply that these investments would cause Fighters’ wage share to decrease. For this to be the case, one would have to assume that the net effect of “Zuffa’s own investments and efforts in increasing the value of the events and athletes it promotes”<sup>74</sup> is to *decrease* the revenue-generating ability of Fighters, relative to some other revenue-generating inputs that Zuffa relies upon to produce Live MMA Events. Under those unrealistic assumptions, an increase in Zuffa’s Event Revenue could flow *disproportionately* to these other revenue-generating inputs, leaving Fighters with a smaller wage share. But this implication contradicts all available evidence in the record, which shows that Zuffa relies on the revenue-generating ability of its Fighters, and has structured its contracts with

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69. Topel Surrebuttal Report ¶8.

70. *Id.*

71. *Id.* (“Event revenues increase when Zuffa’s investments are successful”).

72. Topel Report ¶25.

73. Singer Rebuttal Report ¶¶212-226.

74. Topel Surrebuttal Report ¶8.

Fighters to retain talent within the company long-term.<sup>75</sup> Zuffa's investments that raise Event Revenue necessarily must increase (not decrease) the MRP of its Fighters featured in that Event. Dr. Topel himself recognizes that Zuffa's success is driven by increases in Fighter MRP, which are reflected in increased Event Revenue.<sup>76</sup> Dr. Topel has provided no evidence for (nor has he even articulated) a plausible procompetitive mechanism that would somehow decrease the revenue-generating ability of Fighters, relative to non-Fighter inputs.

27. Relatedly, Zuffa claims in its *Daubert* motion that "if Zuffa increases its advertising and generates more viewers, wage share would decrease, but through a purely procompetitive effect."<sup>77</sup> This assumes (in contradiction to all available evidence and Dr. Topel's own claims) that Zuffa's promotional activities do *not* enhance the revenue-generating ability of its Fighters—that is, do not increase the MRP of the Fighters featured in a particular Event. In fact, the evidence shows that promotional expenditures are not a substitute for, but rather a complement to, a deep roster of high-quality Fighters. Because its Fighters are the only inputs on display during an event (besides the referee and announcers), it is implausible for Zuffa to promote an event in a way that does not increase the MRP of its Fighters. If Zuffa's contention were accurate, then Zuffa would

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75. Singer Report ¶20 [REDACTED]; *id.* ¶28 ("the fighters themselves, not the UFC titles, are what truly drive PPV buy rates," citing McGowan & Mahon, at 1047); *id.* ¶¶156-16 [REDACTED]

*See also* Singer Rebuttal Report ¶132 (showing that Zuffa relies heavily on Headliners (top 15 Fighters) to fill the Top of the Card, and that at least one of the Fighters at the Top of the Card was a Headliner in 158 of 159 events UFC PPV events from 2005 to May 2017; *id.* ¶130 [REDACTED])

76. Singer Rebuttal Report ¶113 (citing Topel Dep. at 23:24-24:3) ("Q. So when Zuffa makes its fighters more effective revenue generators, they're able to generate more revenues when they fight; is that fair? A. Yes."); *id.* at 24:20-25:9 ("Q. Okay. So if what Zuffa does is makes it – makes its fighters more effective revenue generators, then what you were saying is that Zuffa in this example is causing the marginal revenue product of its fighters to increase, correct? A. Yes. Q. And is it your opinion that Zuffa is particularly good at is causing its fighters to be more effective revenue generators? A. I think that's Zuffa's position and I think that's what the evidence tends to show, yes. Q. Is it your opinion? A. I just said yes.").

77. Zuffa Daubert Brief re Dr. Hal Singer at 19-20.



not need contracts to lock up top-ranked Fighters; Zuffa could populate the Top of the Card with mediocre Fighters and still earn the same (or greater) Event Revenues by “generat[ing] more viewers”<sup>78</sup> through advertising. According to this logic, Zuffa’s rivals could have supplanted its dominant position long ago by staging heavily promoted bouts featuring unremarkable Fighters.

28. Dr. Topel’s Surrebuttal also includes the new and incorrect claim that my impact regression “confuses the total revenue from an event with the change in revenues that is solely attributable to the presence of an athlete.”<sup>79</sup> This is false; my analysis involves no such confusion. As explained above, my analysis is based on the fact that *changes* in Event Revenues are a proxy for *changes* in Fighter MRP, such that the two are proportional (not equal). [REDACTED]

[REDACTED] My regression therefore explicitly measures and controls for any variation in Event Revenues or Fighter compensation that is “solely attributable to the presence of an athlete.”<sup>82</sup> For example, my analysis accounts for the fact that a superstar such as Conor McGregor may appropriate a higher fraction of Event Revenue than other Fighters, and holds this “McGregor fixed effect” constant between the actual and but-for worlds.<sup>83</sup>

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78. *Id.*

79. Topel Surrebuttal Report ¶8.

80. Singer Report Table [REDACTED]

81. *Id.* Table [REDACTED]

*Id.* ¶184.

82. Topel Surrebuttal Report ¶8.

83. To illustrate, suppose that events without McGregor generate \$1 million in Event Revenue, and that the wage share is 20 percent in those events. Suppose further that events featuring McGregor generate \$2 million in Event Revenue, and that McGregor is compensated at \$500,000 per event, implying a wage share at events featuring McGregor of  $[0.2 \times \$1 \text{ million}] + \$0.5 \text{ million} / [\$2 \text{ million}] = 35$  percent. Under this fact pattern, the wage share at events featuring McGregor is 15 percentage points higher than the wage share at events that do not feature McGregor (equal to  $35 - 20$ ). My analysis measures this “McGregor effect,” and holds it constant between the actual and but-for worlds.

29. Zuffa also claims falsely in its *Daubert* motion that my analysis does not control for “factors that drive event revenues other than athlete pay.”<sup>84</sup> [REDACTED]

[REDACTED]

[REDACTED] This is incorrect. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]<sup>89</sup> This shows that, under more competitive conditions, Fighter compensation should have risen at least in proportion to Event Revenue, if not more rapidly.

30. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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84. Zuffa Daubert Brief re Dr. Hal Singer at 19-20.

85. Topel Surrebuttal Report ¶16. Relatedly, Dr. Topel cites “Zuffa’s promotional investments and efforts (both in its athletes and in its events),” as factors that may affect Zuffa’s Event Revenue. *Id.* ¶6.

86. *Id.* ¶23.

87. Zuffa Daubert Brief re Dr. Hal Singer at 19-20.

88. Singer Report ¶185; *id.* Table 6. *See also* JEFFREY WOOLDRIDGE, INTRODUCTORY ECONOMETRICS: A MODERN APPROACH 360 (Thompson 4th ed. 2009) [hereafter “Wooldridge”] (noting that time trend variables in a regression can help avoid the fallacy of concluding that “two time series processes appear to be correlated only because they are both trending over time for reasons related to other unobserved factors”).

89. Singer Report Table 6.

90. Zuffa Daubert Brief re Dr. Hal Singer at 19-20.

91. Singer Report ¶185; *id.* Table 6.

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31. [REDACTED]

32. *Fourth*, the thousands of Fighter-specific control variables included in my analysis also control for the possibility that Zuffa deserves credit for making its Fighters more effective revenue generators. For example, to the extent that Zuffa can be credited with the ability of a superstar such as Conor McGregor to generate more Event Revenue than the average Fighter, my analysis already controls for this effect.<sup>95</sup>

33. Neither Dr. Topel nor Zuffa has presented any evidence that Zuffa's promotional activities (or any other non-Fighter input) had any significant effect on Zuffa's Event Revenue

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92. *Id.* Backup to Table 6. *See also* Wooldridge, *supra*, at 456.

93. *Id.* ¶185; *id.* Table 6.

94. *Id.* Backup to Table 6.

95. To illustrate, suppose that events without McGregor generate \$1 million in Event Revenue, and that the wage share is 20 percent in those events. Suppose further that events featuring McGregor generate \$2 million in Event Revenue, and that Zuffa's promotion accounts for 80 percent of the \$1 million in incremental Event Revenue. McGregor would receive \$200,000 per event, and the wage share at events featuring McGregor would be  $[\$0.2 \text{ million} + \$0.2 \text{ million}] / [\$2 \text{ million}] = 20 \text{ percent}$ . This is identical to the wage share at events that do not feature McGregor. Under this fact pattern, the implied "McGregor effect" on the wage share is zero (equal to  $0.2 - 0.2$ ), because Zuffa itself is responsible for the lion's share of incremental revenue at events featuring McGregor. Instead of interpreting this as evidence of Zuffa's ability to exercise monopsony power over McGregor, my analysis assumes that the McGregor effect would remain fixed at zero in the but-for world.

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independent of Fighters, let alone that these non-Fighter inputs somehow shrank the proportion of Event Revenue attributable to Fighters. Despite the absence of any plausible basis for Zuffa's and Dr. Topel's new claim that certain unspecified and undocumented promotional activities by Zuffa have, over time, diminished, rather than enhanced, the relative revenue-generating ability of its Fighters, I have performed additional analyses to refute it. Specifically, I re-specified my impact regressions, adding variables that control for any expenditures that plausibly could be classified as "investments and efforts in increasing the value of the events and athletes it promotes."<sup>96</sup> Using Zuffa's financial records, I calculated Zuffa's promotional expenditures per bout,<sup>97</sup> and included it as a new control variable in my impact regressions. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

**C. The Levels-Based Analyses Proffered by Zuffa's Economists Remain Fatally Flawed, and Dr. Topel's New Defense of Them Is Without Merit**

34. Zuffa's economists assert that compensation levels, rather than wage shares, are the appropriate focus of analysis here.<sup>98</sup> As my rebuttal report explained, such an approach is fatally flawed.<sup>99</sup> Analyzing compensation levels in isolation would hide the fact that Fighter compensation is growing at a slower rate than the revenues that Fighters are generating for Zuffa:

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96. Topel Surrebuttal Report ¶8.

97. [REDACTED]

98. Topel Report ¶¶142-149; Oyer Report ¶¶47-50.

99. Singer Rebuttal Report ¶¶111-114.

Under the levels-based framework advocated by Zuffa's economists, if Zuffa's Event Revenue increased by 900 percent (a factor of ten), while Fighter compensation increased by only one percent, this would be falsely construed as evidence that monopsony power has *not* been exercised.<sup>100</sup> Moreover, Dr. Topel's sole attempt to incorporate Event Revenue into his levels-based analysis is fatally flawed; it assumes that the Challenged Conduct had no effect on the proportion of Event Revenue paid out to Fighters as compensation, and thus assumes away the effect of the Challenged Conduct.<sup>101</sup> Yet Zuffa's *Daubert* motion claims falsely that "there is no finding of injury or damages"<sup>102</sup> when a levels-based analysis is performed. This is incorrect; all levels-based analyses proffered by Zuffa's economists are fatally flawed, and no meaningful inferences regarding impact or damages can be drawn from them one way or the other.

35. In his Surrebuttal, Dr. Topel claims that the fact that his levels-based analysis assumes away the effect of the Challenged Conduct "is a virtue, not an indictment."<sup>103</sup> Dr. Topel is wrong; indeed, his own results show the flaws in his methods. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] This is based on the average

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100. *Id.* ¶39; ¶94. Sports economists have recognized this defect of levels-based analyses. *Id.* ¶94.

101. *Id.* ¶¶115-120. The levels-based regressions proffered by Zuffa's experts also suffer from a technical econometric problem known as endogeneity. *Id.* Dr. Topel claims falsely that I did "nothing to explain what these sources of endogeneity might be." Topel Surrebuttal ¶12. My rebuttal report explains why Dr. Topel's econometric model is biased and unreliable as a result of endogeneity. Singer Rebuttal ¶¶118-119. Professor Manning reaches the same conclusion. *See* Manning Rebuttal ¶30 ("The technical term used by econometricians for this problem is "endogeneity" or "measurement error" in an explanatory variable. By introducing an explanatory variable that can only measure MRP with significant error, Dr. Topel potentially introduces bias into all of his regression coefficients. In contrast, Dr. Singer's approach avoids this problem and so is the correct methodology.").

102. Zuffa *Daubert* Brief re Dr. Hal Singer at 2.

103. Topel Surrebuttal Report ¶11.

104. Topel Report Exhibit 13, columns (4) – (6). Dr. Manning testified that this effect is so implausibly small that Dr. Topel "should have had alarm bells going off in his head." Deposition of Alan Manning 129:13-23 ("I mean, if you look at Dr. Topel's regression, . . . the consequence of this endogeneity would be that the coefficient gets biased

extent to which Zuffa passes through revenue increases to its Fighters, controlling for Zuffa's foreclosure share. Dr. Topel's model assumes that this tiny estimate is entirely the result of competitive forces, thus assuming away the effect of the Challenged Conduct on the way in which incremental revenues are translated into incremental wages.

36. [REDACTED]

[REDACTED]

37. Critically, Dr. Topel's model assumes that this paltry payout to Fighters is *unrelated* to the Challenged Conduct. Put differently, Dr. Topel's model *assumes* that declining Fighter wage shares are the result of competitive forces, rather than the Challenged Conduct. [REDACTED]

[REDACTED]

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towards zero, meaning that it's much smaller than it truly is. And when he estimates coefficient, which is about .08, I think he should have had alarm bells going off in his head that there was something wrong with it.”).

105. [REDACTED]

106. [REDACTED]

107. [REDACTED]

108. [REDACTED]

109. [REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED] In contrast, my own analysis makes no such implausible assumption. Instead, it tests the hypothesis that declining Fighter wage shares are driven by Zuffa's share of Fighters locked up into long-term restrictive contracts, and finds that this is indeed the case.

## II. DR. TOPEL'S MYRIAD NEW AND RECYCLED FALSE CLAIMS SHOULD BE REJECTED

38. As explained below, Dr. Topel's Surrebuttal Report and Zuffa's *Daubert* motion include myriad additional false claims. Some are new; others are recycled from Dr. Topel's first report. All should be rejected.

39. Both my initial report and rebuttal report explained that I performed standard statistical tests confirming that Zuffa's foreclosure did not significantly affect the wage shares of pre-acquisition Strikeforce Fighters. [REDACTED]

[REDACTED]

[REDACTED] In other words, that Strikeforce did not adjust its wage share in response to changes in Zuffa's foreclosure share implies that Strikeforce's wage share serves as a reasonable benchmark for a more competitive but-for world. Accordingly, my impact regression model is specifically constructed to reflect that Zuffa's foreclosure share did not affect the proportion of Event Revenue paid to pre-acquisition Strikeforce Fighters. The way I operationalized this finding was by setting the foreclosure coefficient equal to zero for pre-acquisition Strikeforce bouts—or, equivalently,

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110. See Topel Report Exhibit 13.

111. Singer Rebuttal Report ¶75, n. 274; *id.* ¶84; Singer Report ¶¶182-183; *id.* n.454.

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

118. Singer Rebuttal Report ¶86.

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41. Further, my rebuttal report explained that Dr. Topel misapplied the Chow test by treating it as if it were a license to discard data, which it is not.<sup>119</sup> [REDACTED]

[REDACTED] This is false; my rebuttal report explained that the Chow test is *not* an appropriate basis for excluding data.<sup>121</sup> Dr. Topel also claims falsely that “the Chow test is, in fact, expressly designed to identify situations in which certain data should not be used to estimate an econometric model.”<sup>122</sup> [REDACTED]

42. [REDACTED]

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119. *Id.* ¶¶80-83.

120. Topel Surrebuttal Report ¶25.

121. Singer Rebuttal Report ¶¶80-83.

122. Topel Surrebuttal Report ¶28.

123. *Id.* ¶25; Singer Rebuttal Report ¶82.

124. Singer Report ¶¶182-183; *id.* n. 454; Singer Rebuttal Report ¶¶84-85. [REDACTED]

*Id.* ¶84, n. 297.

125. Topel Surrebuttal Report ¶26.

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43.

126. This is why the statistical tests in my initial report focused on the foreclosure coefficient. Singer Rebuttal Report ¶¶84-85; Singer Report ¶¶182-183; *id.* n. 454. My initial report used a standard *F*-test to confirm “that Zuffa’s foreclosure affected the Fighter Shares of Zuffa Fighters, but not Strikeforce pre-acquisition Fighters.” *Id.*

131. Topel Surrebuttal Report ¶¶25-26.

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44.

137.

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[REDACTED]

[REDACTED]

45. My rebuttal report explained that the career lengths of Fighters while at Zuffa, or while competing in the Relevant Input Market and Submarket, are brief (from approximately 0.8 to 2.5 years). It also explained that Dr. Topel's estimate of 8.9 years was incorrect, and was calculated by including the portion of a Fighter's career spent in the minor leagues (which is comparable including a professional athlete's time playing in high school and college when calculating the length of her professional career).<sup>138</sup> In his Surrebuttal, Dr. Topel claims incorrectly that my calculations are "wrong."<sup>139</sup> Dr. Topel does not identify any mathematical error in any of my calculations, including the fact that the median career length for Zuffa Fighters at Zuffa (typically the apex of a Fighter's career) is approximately 0.8 years.<sup>140</sup> Nor can Dr. Topel refute that his 8.9 year statistic relies on the inclusion of bouts in extremely minor promotions that do not have a single athlete ranked between 1 and 650 in *any* weight class, and are therefore outside even the most expansive conceivable definition of the Relevant Input Market (the Ranked definition).<sup>141</sup> Dr. Topel commits this error again in his Surrebuttal, calculating a new and similar career length of 8.7 years by including all bouts, Fighters, and promoters listed on Sherdog.com.<sup>142</sup> As before,

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[REDACTED]

138. Singer Rebuttal Report ¶64, Table 1.

139. Topel Surrebuttal Report ¶¶37-41.

140. Singer Rebuttal Report ¶64, Table 1. Dr. Topel claims misleadingly that "the short median career length at Zuffa (0.82 years) indicates that Zuffa typically does not keep athletes even as long as one-third of the median 35-month contract calculated by Dr. Singer and that Zuffa athletes are only contractually unavailable to competitors for short periods of time." Topel Surrebuttal Report ¶41. But the short careers of many Zuffa Fighters simply highlight the fact that Zuffa's contracts are one-way ratchets, with a cut clause that allows Zuffa to drop Fighters that lose even a single bout. Singer Report ¶66.

141. Singer Report ¶¶99-111.

142. Topel Surrebuttal Report ¶40.

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this calculation is driven by the inclusion of extremely minor promotions that exceed any reasonable definition of the Relevant Input Market.

46. Dr. Topel claims falsely that I do not describe the methodological errors in his stratified foreclosure-share regressions.<sup>143</sup> [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Dr. Topel is correct, however, to observe that I performed this analysis using revenue-weighted stratified foreclosure shares.<sup>146</sup> [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

47. [REDACTED]

[REDACTED]

[REDACTED] This is incorrect. The weights used in my foreclosure are not chosen to engender that effect; rather, the weights are based on observed drivers of Fighters' "ability to attract viewers, generate event revenues, and hence their value to an MMA promoter."<sup>149</sup> Thus, my weighting methods are designed to capture differences in the

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143. *Id.* ¶30.

144. Singer Rebuttal Report ¶59; ¶122.

145. *Id.* Table A3.

146. Topel Surrebuttal Report ¶30.

147. *Id.* ¶44.

148. *Id.* ¶44.

149. Singer Rebuttal Report ¶128.

quality of Fighters across different MMA promoters.<sup>150</sup> Because these weights generate foreclosure measures that can be shown (all else equal) to decrease Fighter wage shares, the weights can be said to capture Zuffa's ability to foreclose rivals. [REDACTED]

[REDACTED] But the purpose of my weights is to distinguish between the relative quality of athletes (and thus pools of athletes) at different promoters.<sup>152</sup> None of my foreclosure calculations is specific to individual Fighters; the weights assigned to Zuffa and non-Zuffa promoters depend on all of the Fighters associated with each. Thus, what matters for my weighted foreclosure calculations is that they reflect differences in the average quality of Fighters at Zuffa versus the average at other MMA promoters.

48. Zuffa claims falsely that my foreclosure metric, which captures labor market restrictions, is divorced from other standard metrics of market power used in the economic literature and in antitrust-related litigation.<sup>153</sup> As my rebuttal report explained, economists have used both labor market restrictions (which my foreclosure share is explicitly designed to capture) and measures of market concentration (closely related to my foreclosure share) to analyze market power in the labor market.<sup>154</sup> In *High Tech Employee*, plaintiffs' economist (Professor Leamer) used a foreclosure measure calculated using anti-solicitation agreements—that is, using contracts among Defendants. Specifically, Professor Leamer measured the alleged anticompetitive conduct as the proportion of months out of a given year during which a Defendant was subject to one or

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150. *Id.*

151. Topel Surrebuttal Report ¶47.

152. Singer Report ¶128.

153. Zuffa Daubert Brief re Dr. Hal Singer at 2, and at 13; *see also* Topel Surrebuttal Report ¶22.

154. Singer Rebuttal Report ¶¶95-102; ¶104; ¶107 (articles listed in n. 16, *supra* and in n. 17, *supra*).

more of the challenged anti-solicitation agreements.<sup>155</sup> This is directly analogous to my own, contract-based measure of foreclosure.<sup>156</sup>

49. Zuffa also claims falsely that I defined the relevant input markets improperly by focusing on sellers (athletes) instead of buyers (promoters).<sup>157</sup> This is incorrect; as my prior reports make clear, I defined the relevant input market by determining the extent to which MMA promoters other than Zuffa do or do not offer “comparable competitive alternatives to which MMA Fighters could reasonably substitute to counteract an exercise of (buyer) market power by Zuffa.”<sup>158</sup> But I distinguish between promoters by their most important feature: the talent and quality of their respective rosters of Fighters. Thus, the analysis *is* performed from the perspective of Fighters, but the markets are defined to include promoters. Fighters’ willingness to substitute from one MMA promoter to the next depends critically on the career opportunities at each promoter, which in turn depends on the set of Fighters (that is, opponents) each promoter can

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155. Kevin Caves & Hal Singer, *Analyzing High-Tech Employee: The Dos and Don’ts of Proving (and Disproving) Classwide Antitrust Impact in Wage Suppression Cases* 14(3) ANTITRUST SOURCE (February 2015), at 4 [hereafter, “Caves & Singer (2015)”].

156. In its Daubert Brief attacking my work, Zuffa cites *High-Tech Employee* to support its economists’ claim that “the standard way to evaluate compensation in an allegedly monopsonized labor market is by running regressions using the actual compensation, not wage share, as the dependent variable.” Zuffa Daubert re Dr. Hal Singer at 13. As I explained in my rebuttal report, plaintiffs’ economist in *High-Tech Employee* was justified in using compensation levels as his dependent variable, and including employer revenue as a control variable, because his revenue data was limited to *total corporate revenue* for large companies such as Apple, Adobe, and Google. Singer Rebuttal Report ¶120. The annual compensation received by an individual technical employee would represent a miniscule fraction of total corporate revenue. (For example, the share of Apple’s total corporate revenue paid to any individual technical employee is effectively zero). Thus, given the data available, it would not have made sense to calculate labor share as the dependent variable in plaintiffs’ regression model in *High-Tech Employee*. In contrast, the revenue that Zuffa earns *at a particular event* plainly measures the revenue contribution of Fighters *at that event*. *Id.* Professor Manning reached the same conclusion. See Manning Rebuttal ¶22 (“In many situations where one could compute worker share, it is often at too aggregated a level to be useful as a measure of compensation relative to the marginal revenue product...A case in point is the *High Tech Employee* case...there would have been no data measuring the contribution to firm revenue of the class of high-tech employees in that case (the available revenue data consisted of, e.g., Apple’s total global corporate revenue). Therefore, it would not have been possible to construct a wage share variable comparable to the wage share variable used by Dr. Singer in this case (which, as explained below, is constructed using event-specific revenue data).”).

157. Zuffa Daubert re Dr. Hal Singer at 4.

158. Singer Report ¶100.

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offer.<sup>159</sup> Each of my three measures of the Relevant Input Market and Submarket captures different sets of promoters.<sup>160</sup> Zuffa also claims falsely that my market definition analysis turned entirely on record evidence.<sup>161</sup> Although it is true that I extensively analyzed record evidence and industry databases, I did so by applying standard antitrust principles, referencing the relevant literature where appropriate.<sup>162</sup> I also demonstrated that non-Zuffa promoters are at best distant substitutes from the perspective of Fighters, owing to diminished compensation and career opportunities.<sup>163</sup> For the relevant geographic market, I also demonstrated that Zuffa can charge North American customers at least five times as much as promoters outside of North America.<sup>164</sup> [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

50. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

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159. *Id.* ¶99, citing *Merger Guidelines* §12 (In the buying context, market definition turns on “the alternatives available to sellers in the face of a decrease in the price paid by a hypothetical monopsonist.”). *See also id.* ¶104 (explaining that non-Zuffa promoters are not close substitutes from Fighters’ perspective); *id.* Part III.A.1.

160. Singer Report Part III.A.1.

161. Zuffa Daubert Brief re Dr. Hal Singer at 5.

162. Singer Report ¶¶95-98.

163. *Id.* ¶100; *id.* Part III.A.8.

164. *Id.* ¶123.

165. *Id.* ¶¶197-202.

166. *Id.* ¶¶143-144.

167. *Id.* ¶¶228-229.

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[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] As far as Zuffa's compensation

practices are concerned, the start of the Class Period is simply an arbitrary legal delineation (as I understand it, having to do with the statute of limitations under the antitrust laws) with no bearing on Zuffa's compensation structure. Therefore, the statistical test implemented in my rebuttal report was the correct one.

51. Dr. Topel also claims that my summary of an article by Autor et al. is "misleading"<sup>173</sup> because "Autor et al. conclude that the decline in labor's share of GDP has been driven by procompetitive (rather than anticompetitive) activity—the growth of superstar firms."<sup>174</sup> Dr. Topel is incorrect. *First*, as I pointed out in my rebuttal, that the authors of the study would even entertain the hypothesis that declining labor shares reflect anticompetitive conduct—let alone conduct an in-depth empirical analysis of labor shares in hundreds of industries to explore it—

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168. Singer Rebuttal Report ¶161.

169. *Id.* ¶162.

170. Topel Surrebuttal Report ¶35.

171. *Id.* ¶36.

172. Singer Report ¶¶228-229; *id.* Table 7.

173. Topel Surrebuttal Report ¶18.

174. *Id.*

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contradicts Dr. Topel's prior categorical claims regarding the use of labor shares by economists.<sup>175</sup> *Second*, the authors certainly do not conclude that monopsony power cannot be invoked to explain declining labor shares in *any* industry; their findings relate to effects measured at the average across hundreds of industries.<sup>176</sup> *Third*, the authors do not rule out the possibility that superstar firms are able to exercise monopsony power with respect to labor, which could explain why the bulk of their increased productivity has not been passed on in the form of higher compensation. *Fourth*, Dr. Topel ignores other studies cited in my rebuttal report that explicitly link the observed decline in the labor share to a lack of competition, using multi-industry data comparable to Autor et al.<sup>177</sup>

### CONCLUSION

52. For the foregoing reasons, nothing in Dr. Topel's Surrebuttal undermines any of the conclusions of my initial report or my rebuttal report.

\* \* \*



Hal J. Singer

Executed on April 3, 2018.

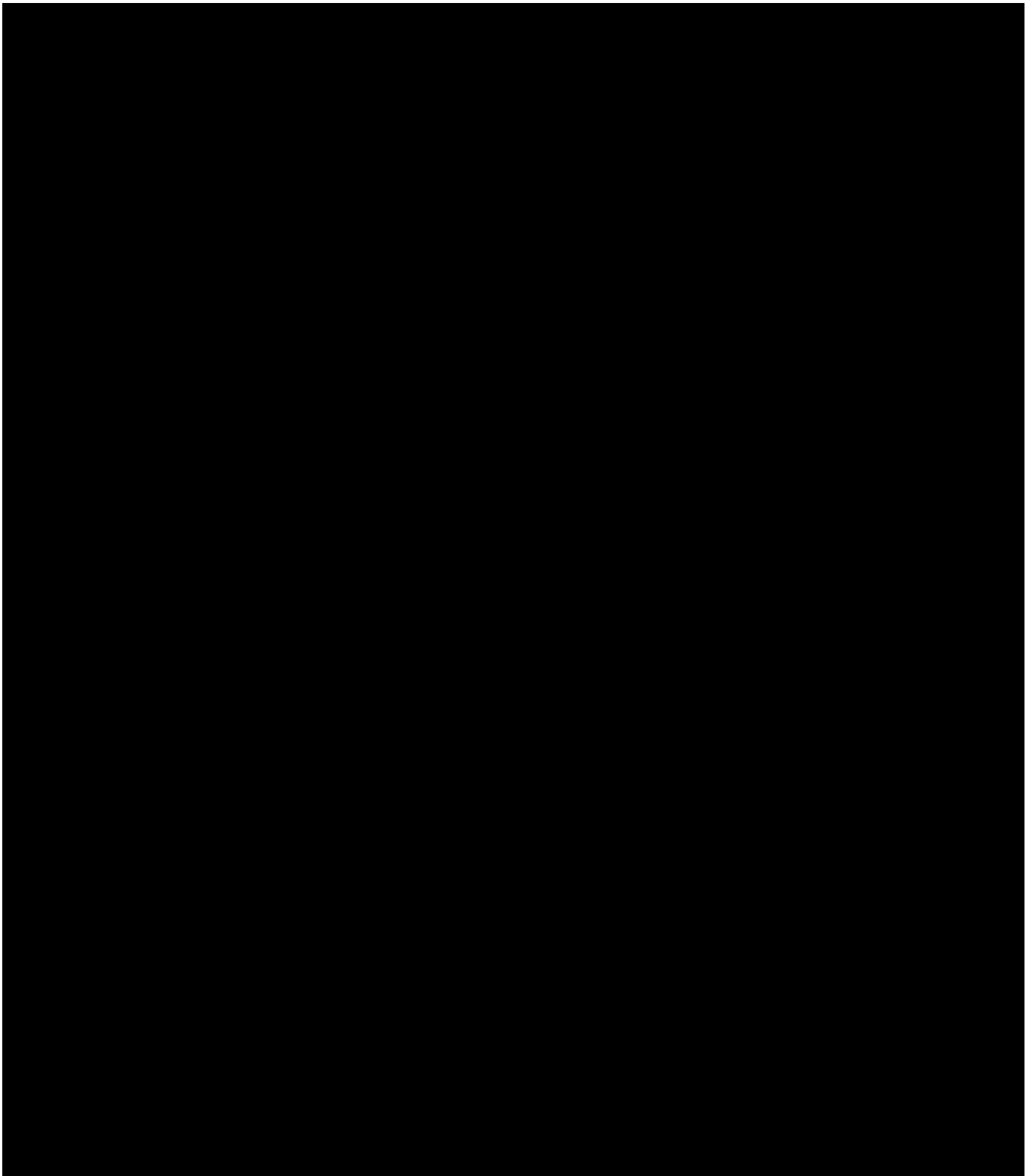
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175. Singer Rebuttal Report ¶104.

176. *Id.*

177. *Id.* ¶107 (citing Barkai; De Loecker & Eeckhou; Elsby et al.).

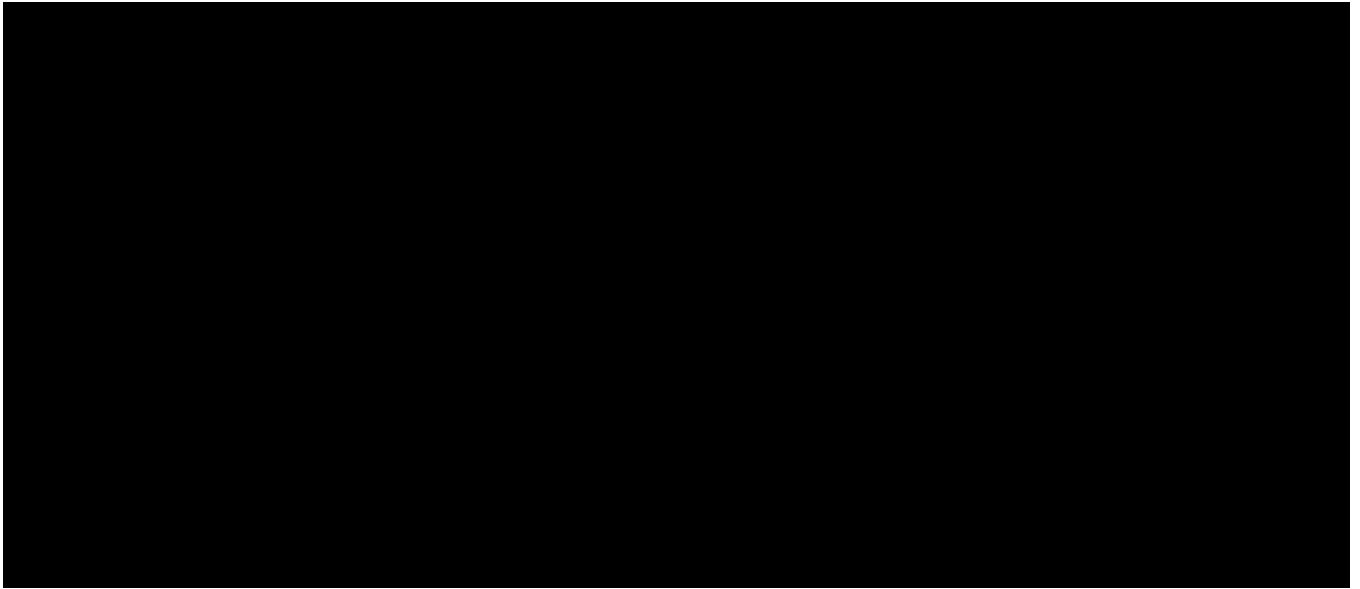
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**APPENDIX: MATERIALS RELIED UPON**

Deposition of Alan Manning, February 8, 2018

Deposition of Paul Oyer, November 29, 2017

Deposition of Robert Topel, December 5-December 6, 2017

Expert Report of Hal J. Singer, Ph. D., Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (August 31, 2017)

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Expert Report of Professor Robert H. Topel, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D.Nev.) (October 27, 2017)

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WME-ZUFFA-00001150

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Zuffa, LLC's Motion to Exclude the Testimony of Dr. Hal Singer under Fed. R. Evid. 702 and Daubert, Cung Le, et al., v. Zuffa, LLC d/b/a Ultimate Fighting Championship and UFC, Case No. 2:15-cv-01045-RFB-PAL (D. Nev.) (February 16, 2018)

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